

SECTION 23 84 00
HUMIDITY CONTROL EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies packaged mechanical dehumidification units for therapeutic pools.

1.2 RELATED WORK

- A. Section 01 00 00, GENERAL REQUIREMENTS: Requirements for pre-test of equipment.
- B. Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS: Seismic requirements for non-structural equipment.
- C. Section 23 05 11, COMMON WORK RESULTS FOR HVAC: General mechanical requirements and items, which are common to more than one section of Division 23.
- D. Section 23 23 00, REFRIGERANT PIPING: Requirements for field refrigerant piping.
- E. Section 23 21 13, HYDRONIC PIPING: Requirements for field hot water piping.
- F. Section 23 22 13, STEAM AND CONDENSATE HEATING PIPING: Requirements for field steam and condensate piping.
- G. Section 23 82 16, AIR COILS: Requirements for run-around system coils.
- H. Section 23 31 00, HVAC DUCTS AND CASINGS: Requirements for sheet metal ducts and fittings.
- I. Section 23 40 00, HVAC AIR CLEANING DEVICES: Requirements for filters including efficiency.
- J. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC: Requirements for controls and instrumentation.
- K. Section 23 05 93, TESTING, ADJUSTING, AND BALANCING FOR HVAC: Requirements for testing, adjusting and balancing of HVAC system.
- L. Section 23 05 12, GENERAL MOTOR REQUIREMENTS FOR HVAC AND STEAM GENERATION EQUIPMENT: Requirements for HVAC motors.
- M. Section 26 29 11, LOW-VOLTAGE MOTOR STARTERS: Requirements for motor starters.
- N. Section 23 08 00 - COMMISSIONING OF HVAC SYSTEMS: Requirements for commissioning, systems readiness checklists, and training.

0. 01 91 00, GENERAL COMMISSIONING REQUIREMENTS

1.3 QUALITY ASSURANCE

- A. Refer to the GENERAL CONDITIONS.
- B. Refer to specification Section 01 00 00, GENERAL REQUIREMENTS for performance tests and instructions to VA personnel.
- C. Refer to paragraph, QUALITY ASSURANCE, in specification Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
- D. Unit(s) shall be provided by a manufacturer who has been manufacturing desiccant dehumidifiers and have been in satisfactory service for at least three (3) years.

1.4 SUBMITTALS

- A. Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
- B. Manufacturer's Literature and Data:
 - 1. Technical data on design operating inlet and outlet conditions, air flows with diagram showing air volumes and conditions throughout the system, dehumidification capacity, filtration and fan motor and electrical power data.
 - 2. A general arrangement diagram with overall dimensions showing all major components with overall dimensions, utility and duct work connections, bolting arrangement, operating weight and required service and equipment removal clearances.
 - 3. Control diagrams for new air conditioning system an electric circuits interface all control set points.
- C. Shop drawings shall indicate assembly, unit dimensions, weight loading, required clearances, construction details, and field connection details.
- D. Submit fan curves with specified operating point clearly plotted and sound power levels for both fan outlet and casing radiation at rated capacity.
- E. Submit unit control system documentation required for interface with BACnet protocol DDC control system. Submit BACnet compliant Protocol Implementation Conformance Statement (PICS) for all controllers.
- F. Submit electrical requirements for power supply wiring including wiring diagrams for interlock and control wiring, clearly indicating factory-installed and field-installed wiring.
- G. Certificate: Evidence of satisfactory performance on three similar installations.

- H. Provide installation, operating and maintenance instructions, in accordance with Article, INSTRUCTIONS, in specification Section 01 00 00, GENERAL REQUIREMENTS.
- I. Performance test report: In accordance with PART 3.
- J. Completed System Readiness Checklists provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 23 08 00 COMMISSIONING OF HVAC SYSTEMS.

1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Air-conditioning, Heating and Refrigeration Institute (AHRI)
410-01.....Forced-Circulation Air-Cooling and Air-Heating Coils
- C. Air Movement and Control Association (AMCA):
99-10.....Standards Handbook
210-07.....Laboratory Methods of Testing Fans for Aerodynamic Performance Rating (ANSI)
301-06.....Laboratory Methods of Testing Fans for Aerodynamic Performance Rating (ANSI)
- D. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
52.2-07.....METHOD OF TESTING General Ventilation Air Cleaning Devices for Removal Efficiency by Particle Size (ANSI)
62.1-10.....Ventilation for Acceptable Indoor Air Quality (ANSI)
- E. American Bearing Manufacturers Association (ABMA)
9-1990 (R2008).....Load Ratings and Fatigue Life for Ball Bearings (ANSI)
- F. National Fire Protection Association (NFPA)
90A-09.....Standard for the Installation of Air-Conditioning and Ventilating Systems
70-0511.....National Electrical Code

1.6 QUALITY ASSURANCE

- A. Fan Performance Ratings: Conform to AMCA 210 and bear the AMCA Certified Rating Seal.

- B. Sound Ratings: AMCA 301; tested to AMCA 300 and bear AMCA Certified Sound Rating Seal.
- C. Fabrication: Conform to AMCA 99.
- D. Air Coils: Certify capacities, pressure drops, and selection procedures in accordance with AHRI 410.
- E. Product of manufacturer regularly engaged in production of pool dehumidification equipment who issues complete catalog data on total product.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage.
- B. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures and finish.
- C. Comply with manufacturer's rigging and installation instructions.

1.8 PROJECT CONDITIONS

Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, fan has been test run, all piping is connected and energized and all wiring complete and tested.

1.9 ADDITIONAL REQUIREMENTS

- A. Provide one additional set of fan belts and disposable panel filters for each unit.
- B. CORROSION PROTECTION
For air-handling unit mounted coils provide the following corrosion treatment:
 - 1. Epoxy Immersion Coating - Electrically Deposited: The multi-stage corrosion-resistant coating application comprises of cleaning (heated alkaline immersion bath) and reverse-osmosis immersion rinse prior to the start of the coating process. The coating thickness shall be maintained between 0.6-mil and 1.2-mil. Before the coils are subjected to high-temperature oven cure, they are treated to permeate immersion rinse and spray. Where the coils are subject to UV exposure, UV protection spray treatment comprising of UV-resistant urethane mastic topcoat shall be applied. Provide complete coating process traceability for each coil and minimum five years of limited warranty.

2. The coating process shall such that uniform coating thickness is maintained at the fin edges. The quality control shall be maintained by ensuring compliance to the applicable ASTM Standards for the following:
 - a. Salt Spray Resistance (Minimum 6,000 Hours)
 - b. Humidity Resistance (Minimum 1,000 Hours)
 - c. Water Immersion (Minimum 260 Hours)
 - d. Cross-Hatch Adhesion (Minimum 4B-5B Rating)
 - e. Impact Resistance (Up to 160 Inch/Pound)
3. Casing Surfaces (Exterior and Interior): All exposed and accessible exterior and interior metal surfaces shall be protected with a water-reducible acrylic with stainless steel pigment spray-applied over the manufacturer's standard finish. The spray coating thickness shall be 2-4 mils and provide minimum salt-spray resistance of 1,000 hours (ASTM B117) and 500 hours UV resistance (ASTM D4587).

PART 2 - PRODUCTS

2.1 DEHUMIDIFIER UNITS

- A. General: Units shall be complete, factory assembled, and tested; and of sizes, arrangements, capacities, and performance as scheduled and as specified in the schedules shown in the drawings for indoor installation of new air conditioning system.
 1. Dehumidification shall be accomplished by use refrigerants, compressors, or chilled water.
 2. Unit(s) shall be capable and designed for year-round, 24-hours-a-day operation; and requiring only connections of ducts, utilities, and remote sensors, controllers, and monitors.
- B. Casing:
 1. All panels and structural steel members shall be constructed of G-90 galvanized steel, treated and painted prior to assembly to provide a chlorine and pool chemical resistant finish. The paint shall be plastic epoxy based powder coating, applied 0.003 inch (2-3 mils) thick, baked and bonded at 420 degrees F until it forms a hard vinyl textured surface.
 2. Structural frame shall be 3/16-inch steel channel base with 12-gauge steel cross bracing Vertical support posts for removable panels shall be formed from 18-gauge galvanized steel and powder coat painted. All nuts, bolts and lock washers in a corrosive atmosphere shall be corrosion protected.

3. Panels shall be formed from 18-gauge galvanized steel. Access panels shall be secured by two or more tool operated latches. All side panels shall be insulated with minimum one-inch duct liner insulation secured to panels by adhesive and panel flanges. The insulation shall be approved for 350 degrees F operating temperature. The fire resistance rating shall conform to NFPA Standard 90A and 90B. The thermal conductivity shall not exceed .29 BTU/hr/F/sq. ft/in at 75 degrees F. All seams shall be bolted and sealed to prevent leaks. The roof shall be gasketed and secured to the frame with Empigard coated galvanized steel screws.
 4. Compressors, pool water condenser and controls, including solenoid valves, expansion valves and refrigerant sight glasses shall be located in compartments isolated from unit air stream to allow for ease of maintenance and to provide protection from the corrosive atmosphere. :
 5. Hinged Access Doors (Standard) shall be provided at the openings for compressor(s), air filters, electrical panel, blowers, motors, and drives. Doors shall be double-wall, insulated, mounted on continuous stainless steel piano hinge, secured with two or more tool-operated latches and sealed against a rigid steel frame with hollow-bulb rubber gasket material. Hinged access doors are required on all outdoor installations.
- C. Pool Water Condenser
1. The internal pool water condenser shall be capable of rejecting the specified amount of the heat recovered from the compressor and the evaporator.
 2. Pool water condenser shall be counter-flow, tube in tube type. Waterside shall be Type L, cupro nickel. For units located outdoors, the pool water condenser shall be equipped with self regulating electric heat tape and insulation for freeze protection.
 3. Pool water heating is controlled by a refrigerant solenoid valve that directs hot refrigerant gas into the pool water condenser as a response from the control system. Water circuit shall be supplied with schedule 80 CPVC pipe stub outs.
- D. Evaporator Coil

1. Coil shall be constructed of copper tubes, 0.006 inch thick copper fins with copper end sheets, frame and intermediate supports (Standard).
 2. All tubes shall be expanded into fin collars. All joints shall be brazed. The coil shall be tested to 500 PSIG for R-410A refrigerant while submerged in water. All brazing shall be done with nitrogen gas inside tubes to give clean internal surfaces. The coil shall be dried and sealed. Inside of tubes shall be commercially free of oxides and foreign matter.
 3. The coil shall be sectioned to provide proportional air to refrigerant latent and sensible heat removal capacity. This capacity modulation shall be accomplished by utilizing multiple thermal expansion valves (TXV) for the evaporator. Each TXV shall be equipped with a refrigerant flow control solenoid valve and refrigerant sight glass.
- E. Condenser Coil (Air Reheat Coil)
1. Condenser coil shall be capable of rejecting all heat (100%) recovered from the compressor and evaporator.
 2. The condenser coil shall be constructed of copper tubes, 0.006 inch thick, copper fins with copper end sheets, frame and intermediate supports
 3. All tubes shall be expanded into fin collars. All joints shall be brazed. The coil shall be tested to 600 PSIG for R-410A refrigerant while submerged in water. All brazing shall be done with nitrogen gas inside tubes to give clean internal surfaces. The coil shall be dried and sealed. Inside of tubes shall be commercially free of oxides and foreign matter.
- F. Dampers
1. Dampers shall be parallel blade, less than 1% leakage, neoprene tipped, anodized-aluminum air foil cross-section dampers. Each damper section shall be operated by a separate motor, factory mounted and wired into the unit control panel.
- G. Drain Pan
1. The floor of each airside section shall be constructed of galvanized steel and powder-coat painted with a protective coating providing a chlorine and pool chemistry resistant finish. The floor sections shall be fully insulated. The floor sections under condensate producing coils shall be sloped toward the drains and piped to a common drain

accessible from either side of the unit. All drain lines within the unit shall be insulated with a minimum ¾-inch closed-cell foam with self regulating electric heat tape for freeze protection.

H. Refrigeration Circuit

2. The refrigeration system shall include a replaceable core liquid line filter dryer, liquid receiver, thermostatic expansion valves, liquid line solenoid valves, two manual valves to isolate filter drier for fast drier core replacement and manual valves to isolate the liquid receiver. Suction lines shall be fully insulated with closed-cell foam insulation. High and low pressure controls and refrigeration service access valves shall be located in a compartment outside of the air stream.

I. Electrical Connections

1. Power Connection: The unit shall be equipped with a single factory-mounted power connection block. Unit shall have appropriately sized factory-mounted motor starter protectors, circuit breakers and a terminal block for single-point field connection of power wiring to the electrical compartment. The terminal blocks shall be suitable for copper conductors only.

J. Dirty Filter Indicator Lights

1. Unit shall be equipped with sensors to detect when the pressure drop through the return air filters indicates the filters are dirty. Pressure drop can be set by user. When the pressure drop is greater than the preset limit, an indicator lamp, visible on the outside of the dehumidifier, is illuminated.

K. Controls and Wiring: Factory-installed microprocessor type to control and monitor unit and communicate to central-control processor, and shall operate dehumidification units and maintain humidity and temperature set points. The controller shall be connected to the building DDC control system via an open protocol BACnet interface.

1. The unit shall have a factory wired and unit mounted central, electrical control panel with a single power supply connection. All internal wiring shall be in accordance with the National Electrical Code. Unit shall have a non-fused main power

disconnect and control components required for automatic operation based on signals from space mounted humidity and temperature controls. Control panel shall have terminals for remote control devices.

2. Controls shall be capable of shutting down the dehumidifier when humidity loads are reduced and the process shall be reversed when there is an increase in humidity loads.
3. Reactivation energy shall be automatically reduced at lower than design humidity loads.
4. Carbon dioxide sensor mounted in return air shall operate minimum outdoor-air damper position.
5. Discharge-air, outdoor-air, conditioned-space, control set-point-temperature, and outdoor-air enthalpy shall be displayed with a LCD in control panel.
6. Filter pressure drop and alarm shall be displayed by an LCD in control panel.
7. Airflow, fans, system, unit operation, and operating mode status shall be displayed in control panel.

L. Fan Section:

Housed Centrifugal Fans

1. Supply and exhaust fans, shall be centrifugal, galvanized steel with baked enamel finish, and shall be belt driven with adjustable sheaves and self-aligning, grease-lubricated ball bearings with extended grease fittings easily accessible inside the casing for process and reactivation air as scheduled.
2. Fans shall be AMCA class II construction, double-width, and double-inlet centrifugal air foil or backward inclined or plug type, factory dynamically balanced and rated in accordance with AMCA standard 210.
3. Fan sized for greater than 3000 CFM shall be belt driven. Belts shall be sized for 150 percent of fan motor HP.
4. Fans shall be vibration isolated internally or externally.
5. Connections at fan discharge shall have flexible duct connectors.
6. Fan motor and Drive: Motors shall be nominal 1750 RPM. Motor for reactivation fan may be direct-drive 3500 RPM. Motors shall be NEMA MG 1 Design B with open drip-proof housing and a minimum service factor of 1.15 complying with requirements in specification Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

7. Plenum Fans Single and/or Multiple Fans in an Array
8. General: Fans shall be Class II (minimum) construction with single inlet, aluminum wheel and stamped air-foil aluminum blades. The fan wheel shall be mounted on the directly-driven motor shaft in AMCA Arrangement 4.
- M. Filter Section: Pleated, disposable pre-filters in outdoor-air inlets. Filters shall be 50 mm (2 inches) thick, installed in filter rack, with a minimum efficiency report value (MERV) of 7 according to ASHRAE 52.2 and 90 percent average arrestance according to ASHRAE 52.1
- N. Coils :
 - Hot Water:
 1. Hot water and heating coil to supply supplemental heating to the space during winter. Refer to specification Section 23 82 16, AIR COILS for requirements.
 - a. Water Coils: Factory tested to 300 psig (2070 kPa) according to ARI 410 and ASHRAE 33.
 2. System shall include pumps and heat exchanger, expansion tank and copper piping for ethylene glycol and water mixture with a freezing point of -28 degrees C (-20 degrees F) and inhibitors for hot water heating coils.
 - Chilled Water:
 1. Coil shall be factory mounted and constructed of copper tubes, copper fins with copper end sheets, frame and intermediate supports. Coil construction of dissimilar metals such as copper/aluminum/galvanized steel/stainless steel or plastic/vinyl coated coils shall not be acceptable.
 2. All tubes shall be expanded into fin collars. All joints shall be brazed. The coil shall be tested to 320 PSIG while submerged in water. The coil shall be dried and sealed. Inside of tubes shall be commercially free of oxides and foreign matter. Coil assembly shall have 1600 PSIG ultimate strength.
 3. Chilled water flow through this coil shall be controlled by a factory-installed, two-way control valve. This valve shall be controlled by the unit's control system. The valve actuator shall have NEMA 2 housing with GoreTex vents and auto open on power failure.
- O. Refrigeration Package: Comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."

1. Energy Efficiency: Equal to or greater than prescribed by ASHRAE/IESNA 90.1-2010, "Energy Standard for Buildings except Low-Rise Residential Buildings."
2. Refrigerant Coils: Copper tubes with mechanically bonded aluminum fins; factory fabricated and tested according to ASHRAE 33 and AHRI 410; with multiple refrigerant circuits, seamless-copper headers with brazed connections, and galvanized-steel frame. Coil and fins shall have a polyester coating. Coils shall have a minimum 300-psig (2070-kPa) working-pressure rating and be factory tested to 450 psig (3105 kPa), and to 300 psig (2070 kPa) while underwater.
3. Compressors: Hermetic, rotary compressors with integral vibration isolators and crankcase heaters that de-energize during compressor operation; with thermal-expansion valves, filter-dryers, sight glasses, compressor service valves, and liquid- and suction-line service valves.
4. Number of Refrigerant Circuits: Two for compressor capacities more than 7-1/2 tons.
5. Refrigerant: R-410A 6. Capacity Control: Cycle compressor.

P. Safety Devices:

1. Low-Pressure Cutout: Manual reset after three auto-reset failures.
2. High-Pressure Cutout: Manual reset.
3. Compressor Motor Overload Protection: Manual reset.
4. Antirecycling Timing Device: Prevent compressor restart for five minutes after shutdown.
5. Adjustable, Low-Ambient, Head-Pressure Control: Designed to operate at temperatures as low as 0 deg F (minus 18 deg C) by cycling condenser fans and controlling speed of last fan of each circuit.
6. Oil-Pressure Switch: Designed to shut down compressors on low oil pressure.

Q. Outdoor-Air Intake Dampers: Return- and outdoor-air intake dampers with damper operator and control package.

1. Leakage: Maximum leakage 1.0 percent at nominal airflow of 54 L/s per kW (400 cfm per ton) (with 250 Pa (1-inch wg) pressure differential).
2. Damper Operator: 24 V ac, close coupled, with spring return.

- R. Remote-control panel shall contain controls and indicator lights consisting of the following:
 - 1. On-off fan switch.
 - 2. Minimum outdoor-air damper potentiometer position LCD.
 - 3. Supply-fan operating indicator light.
 - 4. Mechanical cooling malfunction indicator light.
 - 5. Clogged filter indicator light.
- Q. Electrical Convenience Outlet: 120-V ac fused, duplex straight-blade receptacles separately fused and located inside dehumidification unit casing.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Follow equipment manufacturer's written instructions for handling and installation of equipment.
- B. Adjust seals and purge of rotating wheels as recommended by the manufacturer.
- C. Verify correct settings and installation of controls.
- D. Install seismic restraints for equipment in seismic areas as required under specification Section 13 05 41, SEISMIC RESTRAINT REQUIREMENTS FOR NON-STRUCTURAL COMPONENTS.
- E. Install vibration-control devices.
 - 1. Units with Internally Isolated Fans: Secure units to anchor bolts installed in concrete bases.
 - 2. Floor-Mounted Units: Support on concrete bases using neoprene pads having a minimum static deflection of 6.35 mm (0.25 inch). Secure units to anchor bolts installed in concrete bases.
 - 3. Suspended Units: Suspend units from structural-steel support frame using threaded steel rods and spring hangers.
- G. Unit Support: Install dehumidification units level on structural curbs. Coordinate wall penetrations and flashing with wall construction. Secure units to structural support with anchor bolts.

3.2 CONNECTIONS

- A. Install piping adjacent to machine to allow service and maintenance.
- B. Connect piping to dehumidification units mounted on vibration isolators with flexible connectors.
- C. Connect condensate drain pans using minimum DN 32 NPS 1-1/4copper tubing. Extend to nearest equipment or floor drain. Construct

deep trap at connection to drain pan, and install clean out at changes in direction.

- D. Refrigerant Piping: Comply with applicable requirements in Section 23 23 00, REFRIGERANT PIPING. Connect to supply and return coil tapplings with shutoff valve and union or flange at each connection.
- E. Hot- and Chilled-Water Piping: Comply with applicable requirements in Section 23 21 13, HYDRONIC PIPING. Connect to supply and return coil tapplings with shutoff or balancing valve and union or flange at each connection.
- H. Install ducts to termination in roof-mounting frames. Where indicated, terminate return-air duct through roof structure and insulate the space between roof and bottom of unit.
- I. Ground equipment according to Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
- J. Connect wiring according to Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW).
- K. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 STARTUP SERVICE

- A. Perform the following final checks before startup:
 - 1. Verify that shipping, blocking, and bracing are removed.
 - 2. Verify that unit is secure on mountings and supporting devices and that connection to piping, ducts, and electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - 3. Perform cleaning and adjusting specified in this Section.
 - 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify free fan wheel rotation and smooth bearing operations. Reconnect fan drive system, align belts, and install belt guards.
 - 5. Verify lubrication of bearings, pulleys, belts, and other moving parts.
 - 6. Set outside- and return-air mixing dampers to minimum outdoor-air setting.
 - 7. Install clean filters.

8. Verify that manual and automatic volume control and fire and smoke dampers in connected duct systems are in fully open position.
- B. Perform the following starting procedures for dehumidification units:
 1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated rpm. Replace malfunctioning motors, bearings, and fan wheels.
 2. Measure and record motor electrical values for voltage and amperage.
 3. Manually operate dampers from fully closed to fully open position and record fan performance.
- C. Complete installation and startup checks according to manufacturer's written instructions.
- D. Startup Report: Report findings during startup. Identify startup steps, corrective measures taken, and final results.
- E. The Commissioning Agent will observe startup and contractor testing of selected equipment. Coordinate the startup and contractor testing schedules with the Contracting Officer's Representative and Commissioning Agent. Provide a minimum of 7 days prior notice.

3.4 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Adjust initial temperature and humidity set points.

3.5 CLEANING

- A. Clean dehumidification units internally, on completion of installation, according to manufacturer's written instructions. Clean fan interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheels, cabinets, and coils' entering-air face.
- B. After completing system installation, testing, and startup service of dehumidification units, clean filter housings and install new filters.

3.6 INSTRUCTIONS

Provide services of manufacturer's technical representative for eight hours to instruct VA personnel in operation and maintenance of desiccant dehumidifiers.

3.7 COMMISSIONING

- A. Provide commissioning documentation in accordance with the requirements of Section 23 08 00 - COMMISSIONING OF HVAC SYSTEMS for all inspection, start up, and contractor testing required above and required by the System Readiness Checklist provided by the Commissioning Agent.
- B. Components provided under this section of the specification will be tested as part of a larger system. Refer to Section 23 08 00 - COMMISSIONING OF HVAC SYSTEMS and related sections for contractor responsibilities for system commissioning.

3.8 DEMONSTRATION AND TRAINING

- A. Provide services of manufacturer's technical representative for four hours to instruct VA personnel in operation and maintenance of units.
- B. Submit training plans and instructor qualifications in accordance with the requirements of Section 23 08 00 - COMMISSIONING OF HVAC SYSTEMS.

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Renovate Building 69
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